



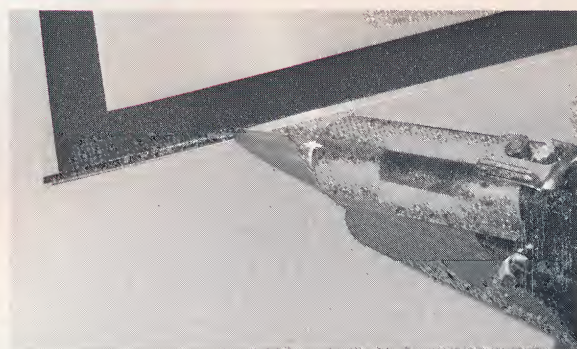
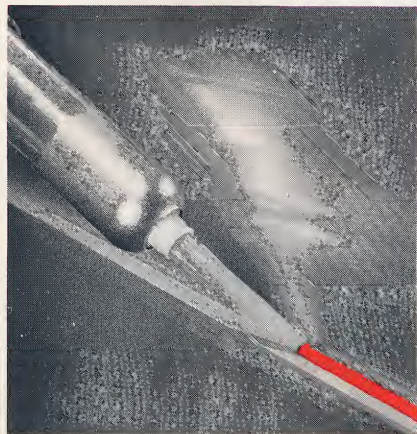
TECHNICAL DATA BOOK

S-2C

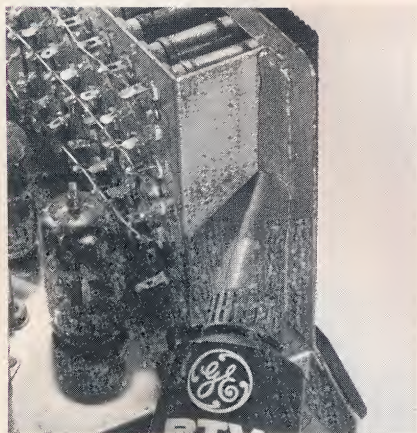
SILICONE RUBBER ADHESIVE/SEALANTS for Industrial Applications

SILICONES

High Temperature RTV-106



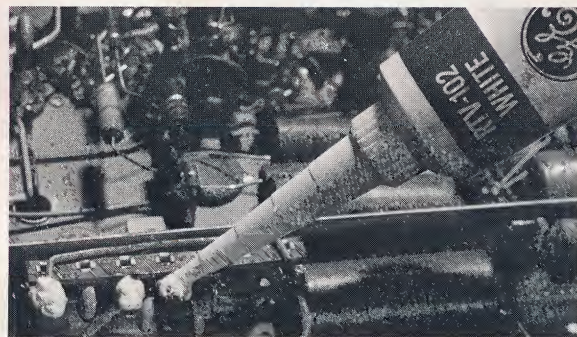
Black RTV-103



Aluminum RTV-109



Translucent RTV-108



White RTV-102



Pourable RTV-112

GENERAL  ELECTRIC

SILICONE PRODUCTS DEPARTMENT
WATERFORD, NEW YORK



a complete line of silicone rubber

GENERAL INFORMATION

Only one elastomeric material — silicone rubber — has proved to be virtually immune to ozone, ultraviolet light, severe temperature change and oxidation through years of rough service. Originally developed by General Electric Research Laboratories for sealing space capsules, silicone rubber adhesive/sealants have now entered America's industries solving problems once considered impossible. How can this be? The answer lies in silicone rubber's amazing properties.

- **RESISTANCE TO MOISTURE AND AGING** — resistance to long time weathering.
- **PERMANENTLY FLEXIBLE** — never hardens, cracks or dries out.
- **MINIMUM SHRINKAGE** — containing no solvents and curing with the least amount of shrinkage.

There are other properties which make General Electric Silicone Rubber especially suited for industry.

- **EASY APPLICATION** — available in either *thixotropic* (def.—a substance whose properties are affected by a mechanical action—*i.e.* flows under pressure) and applied as toothpaste or the new *pourable* adhesive/sealant with the viscosity of paint. Thus in most instances the *thixotropic* materials would be selected where no sagging or flowing could be tolerated as on overhead or vertical surfaces. On

other occasions such as a production line use, the new *pourable* adhesive/sealant would be best.

- **NO MIXING** — apply direct from the tube without adding a catalyst.
- **AIR CURES** — cures to a resilient rubber at room temperatures and thus their name RTV—Room Temperature Vulcanizing.
- **EXCELLENT BONDS WITHOUT PRIMER** — RTV adhesive/sealants bond automatically to many materials including glass, aluminum, steel, ceramics, leather, some plastics and many others. In some instances on difficult surfaces primer may improve the bond.

In addition to these, RTV adhesive/sealants have other properties which make them especially valuable in industrial applications.

- **GOOD ELECTRICAL PROPERTIES** — remaining essentially constant even during curing cycles.
- **LOW TEMPERATURE FLEXIBILITY** — remaining flexible even at temperatures below -75°F. At these low temperatures modulus increases but silicone rubber does not become brittle.
- **HIGH TEMPERATURE PROTECTION** — withstanding temperatures up to 300°F in extended periods and up to 500°F for shorter time periods. For extreme high temperature long time operation at 600°F, RTV-106 is recommended.

PRODUCT SELECTION

General Electric offers a complete family of ready-to-use, one package RTV adhesive/sealants for many industrial applications.

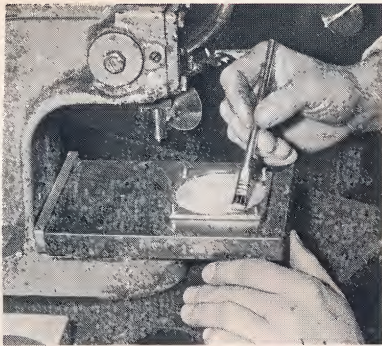
TYPE	PRODUCT	COLOR	TYPICAL APPLICATION
General Purpose Industrial Use (Thixotropic)	RTV-102	White	Affixing name plates
	RTV-103	Black	Rubber repair
	RTV-108	Translucent	See through insulation
	RTV-109	Aluminum	Metal bonding
Extreme High Temperature	RTV-106	Red	Critical "high-temp" use
General Purpose Industrial Use (Pourable)	RTV-112	White	Brushing or spraying on a production line basis.

Packaged in collapsible aluminum squeeze tubes, plastic cartridges and in one and five gallon pails, GE Adhesive/Sealants are easily applied by several techniques ranging from simple dispensing to automatic production line equipment.

adhesive/sealants

INDUSTRIAL USES...

Applications unlimited for GE Silicone Adhesive/Sealants to serve you.



2. RTV seals filament condenser plates in dielectric heaters. Reasons: RTV resists high temperature, insulates electrically, locks out conductive contamination.



6. RTV eliminates need for screws and drilling when used to affix name plates and decorative emblems on any surface. Results: no unsightly rust drainage; plates stay put indefinitely, but can be cut loose when desired.



7. RTV joins the edges of two castings in a yard cleaning machine. The maker eliminated much machining for the surfaces need not be flush to each other. RTV also saved \$4000 over alternate sealing methods.



10. RTV seals glass and plastic instrument lenses against dirt and moisture. RTV-102 is easily applied and will not sag.



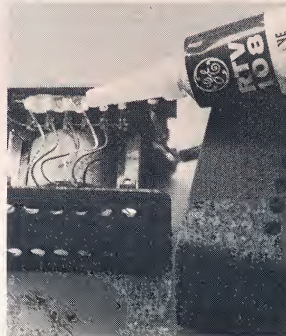
11. RTV seals A&N connectors, terminals, and wire harness joints and other flexible parts. It will absorb shock and vibration eliminating the fatigue failure of connections.



1. RTV bonds vent units and ducts in new Hot-point range, seals areas of metal-to-metal contact to prevent escape of cooking vapors. RTV is damping medium for vent motor, reducing sound and vibration.



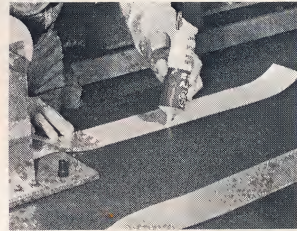
3. RTV fills gaps and hairline crevices in food processing equipment. RTV ingredients have been F.D.A. sanctioned.



8. RTV-108 provides instant, "see-through" insulation as well as vibration resistance and environmental protection. RTV needs no pre-mixing; is applied directly from the tube.



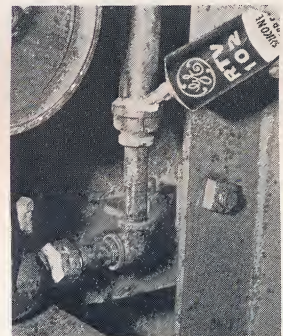
12. RTV-106 can be used for gasket repair or gasket sealing where high temperatures would prohibit normal sealant use.



4. RTV bonds sheeting into desired configuration in low volume production of cylindrical air ducts for dielectric heaters. Results: production costs cut more than 300%.



5. RTV laminates layers of mica sheeting and plates in production of plate condensers. Results: improved operational reliability, assembly time cut from 24 hours to 20 minutes.



9. RTV-102 provides quick relief from low pressure leaks. Silicone Rubber RTV's are water proof and provide excellent protection during a wide temperature range.

THIXOTROPIC RTV SILICONE RUBBER FOR . . .

general purpose industrial use

RTV-102	White
RTV-103	Black
RTV-108	Translucent
RTV-109	Aluminum

Because of many advantages including easy application and wide color selection, these four GE adhesive/sealants are ideal for an unlimited number of industrial applications.

Uncured Properties

Consistency	Soft, spreadable thixotropic paste
Color	White, black, aluminum, translucent (see above)
Specific Gravity	1.07
Solids Content	Contains no solvent.
Non Volatiles % (24 hrs/158°F)	92% (min.)
Flow (Mil-S-8802B)	Nil (0.1 inch max.)
Tack Free Time (77°F, 50% R.H.)	30 minutes
Application Rate gm/min. (Semco Gun with #440 Nozzle 0.125 orifice)	
Gun Pressure 90 ± 2 psi	200-500

Physical Properties

(ASTM pressed sheets cured at 77°F and 50 percent R.H.)

Property	7-Day Cure
Hardness, Shore A	30
Tensile Strength, psi	350
Elongation, %	400
Tear Resistance, Die B, lb/in.	45
Linear Shrinkage, %	1.0
Specific Gravity	1.07

Heat Aging Data

(Typical data obtained on ASTM pressed sheets cured one week at 77°F and 50 percent R.H.)

Property	Time at Temperature (after one week cure)				
	1 wk/ 77°F	24 hr/ 300°F	1 wk/ 300°F	24 hr/ 350°F	24 hr/ 400°F
Hardness, Shore A	30	35	33	36	43
Tensile Strength, psi	350	385	450	425	250
Elongation, %	400	400	400	475	200

Electrical Properties

(ASTM pressed sheets cured 10 days at 77°F and 50 percent R.H. Specimens conditioned 24 hours at 75°F and 50 percent R.H. prior to electrical testing.)

Dielectric Strength, Volts/Mil	
Thickness .058"	550
Thickness .103"	425
Dielectric Constant	
60 Cps	2.8
10 ³ Cps	2.7
10 ⁶ Cps	2.6
Dissipation Factor	
60 Cps	0.0026
10 ³ Cps	0.0026
10 ⁶ Cps	0.0026
Volume Resistivity ohm-cm	3 × 10 ¹⁵

Bonding

See general characteristics of RTV adhesive/sealants on page 7. Typical bond strength data available on test samples are as follows:

Substrate*	Adhesive Characteristics, Properties			
	Shear Strength†		Peel Strength‡	
	psi	% Cohesive Failure	lb/in.	% Cohesive Failure
Unprimed Alclad Aluminum 2024-T6 per QQ-A-362	200	95-100	20	90-95
Primed — SS-4004 Alclad Aluminum 2024-T6 per QQ-A-362	200	100	20	100

*20-mesh stainless steel bonded to substrate listed

†70 hour cure at 77°F and 50% R.H.

‡7 day cure at 77°F and 50% R.H.

Similar values of adhesive strength have been obtained on such materials as anodized and alodized aluminum, copper, titanium, glass, epoxy resin, ML* polymer, brass, silver, carbon steel, Lexan® polycarbonate resin, Textolite®, and silicone rubber (both heat cured and RTV types).

*T. M. DuPont

high temperature industrial use

RTV-106 | Red

RTV-106 is recommended for extreme high temperature applications. This product is specially formulated and processed to perform at temperatures up to 600°F with relatively little change in physical properties.

Uncured Properties

Consistency	Soft, spreadable thixotropic paste
Color	Red
Specific Gravity	1.07
Solids Content	Contains no solvent
Non Volatiles % (24 Hrs/158°F)	96% (min.)
Flow (Mil-S-8802B)	Nil (0.1 inch max.)
Tack Free Time (77°F, 50% R.H.)	30 minutes
Application Rate gm/min. (Semco Gun with #440 Nozzle 0.125 orifice)	
Gun pressure 90 ± 2 psi	200-500

Physical Properties

(ASTM pressed sheets cured at 77°F and 50 percent R.H.)

Property	2-Day Cure
Hardness, Shore A	33
Tensile Strength, psi	350
Elongation, %	400
Tear Resistance, Die B, lb/in.	50
Linear Shrinkage %	<0.5
Specific Gravity	1.07

Electrical Properties

(ASTM pressed sheets cured 10 days at 77°F and 50 percent R.H. Specimens conditioned 24 hours at 75°F and 50 percent R.H. prior to electrical testing.)

Dielectric Strength, Volts/Mil	
Thickness .058"	550
Thickness .103"	425
Dielectric Constant	
60 Cps	2.8
10 ³ Cps	2.7
10 ⁶ Cps	2.6
Dissipation Factor	
60 Cps	0.0026
10 ³ Cps	0.0026
10 ⁶ Cps	0.0026
Volume Resistivity ohm-cm	3 x 10 ¹⁵

Heat Aging Data

(Typical data obtained on ASTM pressed sheets cured one week at 77°F and 50 percent R.H.)

Property	Time at Temperature (after one week cure)					
	48 hr/ 77°F	24 hr/ 480°F	1 wk/ 480°F	24 hr/ 600°F	1 wk/ 600°F	2 wk/ 600°F
Hardness, Shore A	33	28	28	30	45	65
Tensile Strength, psi	350	370	390	325	420	475
Elongation, %	400	550	540	500	300	180
Tear, Die B, lb/in.	50	47	43	43	40	40
Linear Shrinkage, %	<0.5	2.5	2.5	4.0	9.0	16.0
Weight Loss, %	....	4.7	5.2	11.9	23.4	40.6

Bonding

RTV-106 High Temperature Industrial Adhesive/Sealant is similar in bonding properties to General Purpose Industrial (Thixotropic) type. For bond strengths see the bonding section of that product or the general bonding characteristics on page 7.

POURABLE RTV SILICONE RUBBER FOR . . .

general purpose industrial use

RTV-112 I White

RTV-112 is a precatyzed RTV liquid silicone rubber. Having a low viscosity (approximately 300 poises) in the uncured state, this material is readily pourable and offers self-leveling characteristics. Ready to use, it cures at room temperature to a firm, flexible, resilient rubber on exposure to moisture from the air. The sealant contains no solvent, cures with very little shrinkage and adheres to most surfaces without the aid of a primer.

Uncured Properties

Consistency	Pourable, like paint
Color	White
Specific Gravity	1.05
Solids Content	Contains no solvents
Non-Volatiles, % (24 Hrs/158°F)	95% (min.)
Flow	Self-Leveling
Viscosity, Poises	300
Application Rate gm/min. (Semco Gun with #440 Nozzle 0.125 orifice)	
Gun Pressure: 20 ± 2 psi	200
90 ± 2 psi	1300
Tack Free Time (77°F, 50% R.H.)	30 minutes

Physical Properties

(ASTM pressed sheets cured at 77°F and 50 percent R.H.)

Property	2-Day Cure	7-Day Cure
Hardness, Shore A	30	32
Tensile Strength, psi	250	350
Elongation, %	300	350
Tear Strength, Die B, lb/in.	25	25
Linear Shrinkage, %	1	1
Specific Gravity	1.05	1.05

Electrical Properties

(ASTM pressed sheets cured one week at 77°F and 50 percent R.H. Specimens conditioned 24 hours at 75°F and 50 percent R.H. prior to electrical testing.)

Dielectric Strength Volts/Mil thickness .065"	542
Dielectric Constant	
60 Cps	2.70
10 ³ Cps	2.65
10 ⁶ Cps	2.60
Dissipation Factor	
60 Cps	.0004
10 ³ Cps	.0004
10 ⁶ Cps	.0018
Volume Resistivity ohm-cm	2 × 10 ¹⁵

Heat Aging Data

(Typical data obtained on ASTM pressed sheets cured one week at 77°F and 50 percent R.H.)

Property	Time at Temperature (after one week cure)			
	1 Wk/ 77°F	24 Hrs/ 300°F	24 Hrs/ 350°F	24 Hrs/ 400°F
Hardness, Shore A	32	32	30	28
Tensile Strength, psi	350	320	300	280
Elongation, %	350	300	290	280
Tear, Die B, lb/in.	25	28	30	33

Bonding

See general information concerning bonding characteristics of all GE Adhesive/Sealants on page 7. Bond strengths of RTV-112 are somewhat less than the bond strengths of General Purpose Industrial Use (Thixotropic) RTV's. Typical bond strength data available on RTV-112 follows:

Substrate*	Adhesive Characteristics, Properties			
	Shear Strength†		Peel Strength‡	
	psi	% Cohesive Failure	lb/in.	% Cohesive Failure
Unprimed				
Copper	90-100	100	....	....
Aluminum 2024-T6	80-90	95-100	6	90
Glass	**	100	....	....
Clear Acrylic	**	100	....	....
Primed — SS-4004				
Aluminum 2024-T6	140	100	8	100
Stainless Steel #304	140	100	....	....
Steel — Cold Roll #SE-1010	140	100	8.5	100

*20-mesh stainless steel screen bonded to substrate listed.

**Substrate broke before bond failed.

†70 hour cure at 77°F and 50% R.H.

‡7 day cure at 77°F and 50% R.H.

GENERAL APPLICATION and HANDLING SUGGESTIONS

Applying

RTV adhesive/sealants are applied directly from the tube and will air cure without any application of heat. They first form a surface skin with a complete cure progressing through the material. Under typical ambient conditions, they develop a tack-free surface in 15 to 30 minutes and cure through a 1/8 inch thickness in less than 24 hours. Lower temperatures and humidity will slow the rate of cure. Higher temperatures and humidity will accelerate the cure. (Most optimum conditions are 90°F and 90% R.H.).

During initial stages of cure, a noticeable odor caused by acetic acid is produced. This odor will completely disappear at a later stage of cure. When using RTV on electrical or electronic parts, a preliminary check is suggested to determine the effects of small quantities of acetic acid on the specific component. In most cases, priming the part prior to applying the RTV will prevent any possibility of corrosion.

General Electric adhesive/sealants are designed and packaged for easy industrial application. For information concerning automatic dispensing for production line use, write for Technical Information Reports TSR-1711, TSR-1712 and appropriate CDS-598 equipment catalogues.

Bonding

RTV adhesive/sealants will bond to most clean surfaces without the aid of a primer. When cleaning, use a suitable solvent such as toluene, xylene, or acetone to remove all dirt and grease. When practical, wipe the surface dry with a clean cloth or paper towel prior to applying the sealant. Most materials can be bonded without priming (most metals, glass, ceramics, silicone rubber and many rigid plastics). Adhesion is obtained merely by applying RTV directly to the clean substrate, completely covering the entire surface, and allowing it to air cure.

The bond will improve with time—tests have shown that after three weeks the bond strength exceeds the cohesive strength of the rubber itself.

RTV will produce fair bonds with adhesive rather than cohesive failure to organic rubbers or flexible plastics that do not contain fugitive plasticizing agents.

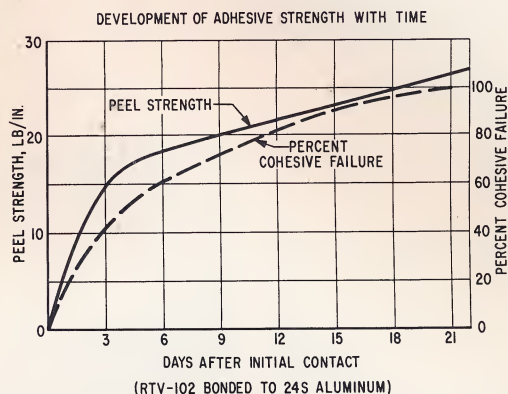
Due to the various types of bond strength required for different applications, it is suggested that a preliminary check be made to determine the bonding effects of RTV with specific materials.

Surface Preparation

When cleaning, use a suitable solvent such as toluene, xylene, or acetone to remove all dirt and grease. When practical, wipe the surface dry with a clean cloth or paper towel prior to applying the sealant.

Cure Time

The time required for RTV to form a maximum bond will vary according to type and thickness of material, humidity, temperature, etc. When bonding non-porous substrates, a one inch width of RTV will completely cure within three weeks at ambient temperatures and humidities. Frequently, enough adhesion will develop within 60 minutes or less to permit handling the part. However, no appreciable stress should be exerted on the bond until it develops its full adhesive strength. If possible, allow three weeks for optimum results.



Clean Up and Removal

Before cure, solvent systems such as chlorinated hydrocarbons or aromatic hydrocarbons such as xylene are most effective.

After cure, chemical paint strippers such as Ordcostrip® No. 1 (from Oreland Research Co., Phila., Pa.) or Epoxystrip® No. T-251-C (from Beck Equipment & Chemical Co., Cleveland, Ohio) are very effective for removing well bonded RTV adhesives.

For additional information refer to Technical Information Report TSR-1709.

Storage and Shelf Life

RTV adhesive/sealants are commercially available in 3 and 12 ounce collapsible aluminum tubes, in 6 and 12 ounce plastic cartridges, and in bulk containers for use with automatic pressure guns and dispensing equipment. In their original aluminum tubes and stored at temperatures below 80°F, the useful shelf life will be in excess of one year from date of shipment. A 12 month's shelf life may be expected in the plastic cartridges.

To prevent any curing within the tube, wipe off all excess material around the nozzle after each application and keep tightly sealed. If a small amount of cured RTV does form around the opening during exposure to air, it is easily removed and will not affect the remainder of material in the tube.

Standards

Standard test procedures developed for the rubber industry are frequently used in measuring silicone elastomers. The following standard tests have been used in obtaining test data shown here:

Specific Gravity	A.S.T.M.	D-792
Durometer, Hardness, Shore A	A.S.T.M.	D-676
Tensile Strength and Elongation	A.S.T.M.	D-412
Tear Resistance	A.S.T.M.	D-624
Dielectric Constant and Dissipation Factor	A.S.T.M.	D-150
Dielectric Strength	A.S.T.M.	D-149
Volume Resistivity	A.S.T.M.	D-257

Specifications

The properties shown in this data book have been determined from laboratory tests and are typical of the products. However, a reasonable degree of variation will occur in commercially produced material. The typical values shown here should not be used as a basis for specifications. For assistance and recommendations in the preparation of specifications, please contact the Silicone Products Department at Waterford, New York. Publication CDS-372 and CDS-351, "Adhesive/Sealant Specification Guides" are available upon request.

General Electric RTV Silicone Rubber Adhesive/Sealants may be ordered from your nearest G-E Silicone Sales Office or from your authorized G-E Silicone Agent or Distributor.

Inasmuch as General Electric Company has no control over the use to which others may put the material, it does not guarantee that the same results as those described herein will be obtained. Each user of the material should make his own tests to determine the material's suitability for his own particular use. State-

ments concerning possible or suggested uses of the materials described herein are not to be construed as constituting a license under any General Electric patent covering such use or as recommendations for use of such materials in the infringement of any patent.



supplementary data

S-3C

RTV-630, RTV-632, RTV-634

ULTRA HIGH STRENGTH RTV's

INTRODUCTION

A new series of General Electric two-package RTV's offers a number of outstanding advantages in applications requiring a silicone rubber compound with increased strength, extraordinary resistance to pressures at high temperatures, and long-term performance capabilities. The product features listed below will open new applications for RTV silicones.

- * Performance capabilities encompassing general industrial applications, model duplication and plastics processing
- * Physical properties equivalent to heat cured silicone rubber
- * Price levels calibrated to match application requirements
- * Reversion resistance
- * Thick section cure
- * Rapid elevated temperature cure
- * Modulus versatility
- * Flame retardance
- * Easy blending
- * Extreme processing stability
- * Resistance to temperature extremes

RTV-630 is the standard bearer of this new series of two-package RTV's. RTV-632 and RTV-634 are complementary products offering easier handling, reduced viscosity and lower cost advantages, with a variation in physical properties profile.

Engineering grade RTV-630, an ultra high strength material, is particularly well suited for plastics thermoforming, casting and embossing applications. A pastel blue pourable liquid in its uncured form, it has a tear strength of approximately 100 lb/in., die B, which compares to about 40 for typical liquid silicone rubbers.

Intermediate RTV-632 can be used for fabricating silicone rubber parts, for potting and encapsulating, and as a high temperature resistant sealant or protective coating for manufactured products. Blue-green in color, it has an intermediate physical properties profile.

Standard grade RTV-634, lowest cost compound in the series, is recommended for making flexible prototype and model molds with limited production run requirements. Green in color, it is an easily pourable liquid.

All three compounds are compatible and can be custom-blended to meet specific physical and viscosity requirements.

PRODUCT DESCRIPTION

RTV-630 - Medium viscosity liquid that cures at room temperature with the addition of a catalyst to form a high tear resistant RTV. RTV-630 develops physical properties similar to standard heat cured silicone rubber while maintaining RTV processing characteristics.

RTV-634 - Low viscosity compound primarily suggested for short run model duplication where physical demands are modest and economy is an important consideration.

RTV-632 - Intermediate viscosity grade made from a blend of 60 parts RTV-630 and 40 parts RTV-634. The RTV-632 offers a compromise on price, handling and physical property profile.

MIXING PROCEDURE

In all cases the product line is composed of A and B portions. The normal mix ratio is 10 parts of A to one part of B. The only exception is with RTV-630 where it is possible to substitute a 15:1 or 20:1 (A:B) mix ratio. This change in mix ratio reduces durometer and produces higher elongation without affecting tear properties. It has been found that optimum mold casting life using epoxies occurs with the 20:1 mix ratio.

WORKING TIME

Upon blending A and B portions a workable viscosity exists for a minimum of two hours at room temperature conditions (75°F). Blending at higher temperatures will decrease working time depending upon the excess in mixing temperature.

DEAERATION

Immediately after mixing A and B portions, air must be removed to prevent bubbles and voids. A reduction pressure to 20 mm or below for 15 to 20 minutes is usually adequate. Please allow for a volume expansion of five times the quantity being deaerated. For best results, raise and lower pressure a number of times to break bubble formation.

In the production of molds, it may be possible to cure in a pressure chamber at 50 to 90 pounds line air pressure. Utilization of this technique eliminates the deaeration step and produces compact, bubble-free molds.

In applications where RTV-632 and RTV-634 are being molded around the prototype, the prototype surface should be painted with the RTV as a further deterrent to surface bubbles. RTV-630, possessing higher viscosity than RTV-632 and RTV-634, does not lend itself well to this application technique.

CURE CYCLES

Sufficient cure is realized in 48 hours at room temperature conditions to permit handling. An elevated temperature post cure is then recommended to quickly develop maximum physicals. One hour at 212°F is adequate for physical property development while an eight-hour post cure is suggested in cases where extended casting cycles are desired for molding epoxy casting resins.

THICK SECTION CURE

At room temperature conditions, section thickness has no bearing on the 48-hour cure cycle. In applications where rapid elevated temperature cures are employed, oven residence time must be sufficient to heat through the silicone rubber.

GENERAL PROPERTIES

	RTV-630	RTV-632	RTV-634
Specific Gravity	1.28	1.24	1.18
Average Viscosity, cps	160,000	48,000	8,000
Color (Pastel)	Blue	Blue-green	Green
Solids	100%	100%	100%
Consistency	Pourable	Pourable	Easily Pourable
Minimum Uncatalyzed Shelf Life	6 months	6 months	6 months

PHYSICAL PROPERTIES*

	RTV-630	RTV-630	RTV-632	RTV-634
Compound/ Catalyst Mix Ratio	10:1	20:1	10:1	10:1
Tensile, psi	850	650	700	400
Elongation, %	300	400	180	220
Tear, Lbs. (Die B)	90	90	50	20
Durometer (Shore A)	70	55	55	35
Linear Shrinkage, % (R.T.)	<.2	<.2	<.2	<.2

*ASTM slabs press cured 30 minutes at 212°F

IMPORTANT CONSIDERATIONS

Extending Mold Life

(a) Epoxy Casting Resins - Amine catalyst used to cross link the epoxy are gradually absorbed by the silicone rubber. Under continued exposure and absorption, a bond develops between the silicone and the epoxy compound. When this condition exists, the silicone mold tears during removal of the cast epoxy part. In order to minimize this effect an occasional bake-out is recommended (8 hours at 300°F) to vaporize the amine contaminants.

Another approach would be to dress the mold surface with a silicone diluent, RTV-910. This treatment is effective and will prolong mold life; however, it does leave a silicone film on the cast epoxy part which may have to be removed prior to painting.

(b) Vinyl Plastisols - Conventional PVC plasticizer like amine catalysts are capable of being absorbed by the silicone rubber. Failure eventually occurs, due to the gradual decrease in the silicone physical properties resulting in deterioration of the mold surface. Once again a bake-out is recommended (8 hours at 350°F) to minimize plasticizer effect.

Cure Inhibition

RTV-630, RTV-632 and RTV-634 are compatible compounds utilizing the same type of catalyst system. Certain prototype materials such as butyl and chlorinated rubber, sulfur compounds, amines and metal soap cured RTV's are able to inhibit cure. Cure inhibition can best be described as a surface condition whereby the silicone remains tacky to a depth of approximately five mils.

One method of circumventing this problem is to utilize a barrier coat (SS-4150) along with a room temperature cure for the silicone rubber. Elevated temperature cures are not recommended since contaminants within the prototype or master are prone to vaporize through the barrier coat into the silicone rubber.

Another worthwhile preventative is cleaning of metal or plastic masters with xylene or toluene if prior contact has been made with sources of inhibition.

STORAGE AND HANDLING PROBLEMS

Neither the A nor B portions are known to produce any toxic effect upon contact with the skin. These materials should be stored in clean, tightly closed containers in a cool, dry place.

The A and B portions can generate flammable gas on contact with acidic, basic or oxidizing materials, and such contact should be avoided.

ACCESSORY ITEMS

Primer SS-4120

With the use of Primer SS-4120 RTV-630, RTV-632 and RTV-634 can be bonded to most substrates. The surface to be bonded must be clean and dry. If surfaces are resistant to solvent cleaning, a trichlorethylene wash is suggested. Surface roughening will improve the bond to metals.

The primer is applied by brushing, spraying or dipping. Film thickness should be between 0.1 and 0.3 mils, typical of that obtained with one dip, or a single brushing. Films greater than 0.5 mils in thickness show decreased bond strength.

The primer should be allowed to air dry for one hour before the compound is applied.

Primer SS-4120 is supplied in a methanol solvent. Methanol is flammable and poisonous. Keep SS-4120 away from heat, sparks and open flame. Keep container closed, use only with adequate ventilation and avoid breathing of vapor.

Barrier Coat SS-4150

Barrier coat SS-4150 is recommended for substrate coating where the substrate could inhibit cure of RTV-630, 632 and 634. The barrier coat is easily applied in a uniform continuous film by either dipping or brushing.

Resultant coat will be pale blue in appearance with a film thickness of approximately one mil. Properly applied,

the coating will prevent substrates, such as rubber, vinyl and epoxy, from inhibiting room temperature cure of subject silicone compounds. The barrier coat easily releases from the silicone.

Rapid elevated temperature cures may often be employed depending on the type of contaminant involved.

Diluent RTV-910

The RTV-910 is a dimethyl silicone fluid which serves a dual purpose for the tool or model maker. Its primary contribution is that of a viscosity depressant. Addition of up to 5% of RTV-910 will lower viscosity at some sacrifice in physical properties of the silicone rubber.

A secondary function of RTV-910 is for wipe-on treatment of silicone rubber molds. Occasional surface application will improve release of epoxy cast parts. Frequency of use will depend on the intended purpose for which the epoxy part is being made. If a subsequent paint coat is planned steps must be taken to solvent clean (xylene, trichlorethylene) the epoxy part to remove residual RTV-910 from the surface.

**SILICONES**

supplementary data

S-3C-4FILE WITH
DATA BOOK**S-3C****RTV-340****LOW MODULUS RTV SILICONE RUBBER COMPOUND****DESCRIPTION**

White medium viscosity room temperature curing silicone rubber compound having low modulus properties which include excellent high elongation, high peel strength, low durometer, and improved resistance to tear.

APPLICATIONS

RTV-340 offers improved rubber performance in the following application areas:

1. Preparation of excellent flexible molds, particularly those for highly intricate patterns with extreme draws and deep undercuts.
2. Sealant against gases, liquid, and dirt where high elongation and high peel strength are needed in addition to broad temperature range and age resistance requirements.
3. Excellent for use in absorbing mechanical shock and vibration because of its low durometer and may also be used to replace sponge in some applications.
4. Electrical potting, encapsulation, and impregnation for electrical and environmental insulation.

TYPICAL PRODUCT PROPERTIES AND DATA

(These values are not to be used for preparing specifications)

A. Uncatalyzed Base Compound

Color	- White
Viscosity Range	- 25,000-65,000 cps at 25°C ⁽¹⁾
Consistency	- Pourable liquid
Specific Gravity	- 1.15
Non-volatile content, % min. (24 hrs. at 158°F)	- 98
Lbs. per Gallon	- 9.6

B. Catalyzed Compound

Compound catalyzed by 5% or 10% by weight of Special paste catalyst RTV-9891. Liquid catalyst RTV-9801 may also be used. (Ref. Section IV Handling)

- ⁽¹⁾ Measured with Brookfield RVF Viscometer, #6 Spindle at 10 rpm. Sample stirred before taking reading.

	RTV-340/catalyst at	
	0.5 wt % RTV-9801	10 wt % RTV-9891
Initial Application Rate, g/min. ⁽²⁾	400	700
Application Rate, g/min. ⁽²⁾ (1/2 hr. after catalyzation)	100-125	200
Application Rate, g/min. ⁽²⁾ (1 hr. after catalyzation)	25-50	25-40
Work Time, hours	1-2	1-2
Tack Free Time, hours	3-4	3-4
Hardness, Shore A 48 hours	15-20	15-20
Weight Loss on Cure, % (at 77°F) 48 hours	0.06	0.06
1 week	0.09	0.09

C. Cured Compound

1. Physical Properties—
cold pressed ASTM sheets cured 48 hrs/77°F

Catalyst	0.5 wt % RTV-9801	10 wt % RTV-9891
Specific Gravity	1.15	1.15
Hardness, Shore A	15-20	15-20
Tensile Strength, psi	200	210
Elongation, %	300	300
Tear Resistance, Die B, lb/in.	> 40	> 40
Bashore Resilience, %	60	60
Brittle Point, ASTM D-746	Below -100°F	Below -100°F
Peel Strength, lb/in. (bonded to Alclad Aluminum, SS-4004 primed, 10-20 mesh Aluminum Screen used)	12	12

GENERAL ELECTRICSILICONE PRODUCTS DEPARTMENT
WATERFORD NEW YORK

Inasmuch as General Electric Company has no control over the use to which others may put the material, it does not guarantee that the same results as those described herein will be obtained. Each user of the material should make his own tests to determine the material's suitability for his own particular use. Statements concerning possible or suggested uses of the materials described herein are not to be construed as constituting a license under any General Electric patent covering such use or as recommendations for use of such materials in the infringement of any patent.

2. Physical Properties - Heat Age

ASTM sheets prepared as above and heat aged in circulating air oven

	24 hrs/ 300°F	24 hrs/ 400°F	24 hrs/ 480°F
Hardness, Shore A	24	25	25
Tensile Strength, psi	280	285	285
Elongation, %	425	400	235

- (2) Application Rate tested by placing catalyzed compound in Semco Sealing gun cartridge with a Semco 440 nozzle with orifice diameter 0.125 ± 0.005 inch attached. A constant air-pressure supply of 90 ± 2 lb/in.² was connected to the gun.

3. Electrical Properties

ASTM sheets prepared as above, plus 24 hours at 23°C (75°F) and 50% RH prior to testing for electrical characteristics.

Dielectric Strength Volts/mil. (60 mil. sheet)	580
Dielectric Constant	
60 cps	2.75
10 ³ cps	2.61
10 ⁶ cps	2.50
Dissipation Factor	
60 cps	.0098
10 ³ cps	.007
10 ⁶ cps	.004
Volume Resistivity Ohm - cm.	2×10^{14}

SUGGESTIONS FOR HANDLING

A. Mixing and Curing

RTV-340 must be cured with either special paste catalyst RTV-9891 or liquid RTV-9801. When using RTV-9891, a 10% by wt. addition is recommended and should give the best cured rubber properties; however, catalyst and concentration may be varied to suit specific applications.

Liquid catalyst RTV-9801 is recommended when working with smaller amounts of RTV-340. Catalyst concentrations of 0.5 to 1.0 wt. % (drops addition to grams of compound) provide cure characteristics and final rubber properties as described by RTV-9891 paste system at the 5% and 10% ratios respectively.

In order to obtain a uniformly cured rubber, it is necessary to mix the curing catalyst thoroughly into the compound. Mixing should be performed in such a manner that a minimum amount of air is entrapped in the compound to eliminate voids. A vacuum treatment may be used to remove air bubbles.

DAB 765

NOTE: 1. This compound-catalyst system cures best under low humidity conditions and in closed molds. High humidity conditions at the time of cure may produce a slightly tacky surface. This tack will disappear in several days. The rubber may be dusted with a talc if it remains a problem. Higher catalyst levels will eliminate this tack condition.

2. Adjusting the ratio of compound to catalyst will provide a variation in work life and cure time characteristics.

B. Thick Section Cure

Excellent thick section cures in closed molds can be achieved by catalyzing RTV-340 with special paste catalyst RTV-9891 or liquid RTV-9801. The aid of heat or exposure of compound to air is not required; however, if faster cure is desired, the part may be heated to 150°F for several hours.

If thick sections of the product are to be used in service over 300°F, the cured product should be temperature conditioned prior to service. A suggested program is four to eight hours at 50°F intervals from 200°F to service temperature. Longer times at each temperature may be required for larger parts.

C. Storage and Shelf Life

RTV-340 should be kept in clean, tightly sealed containers when not in use. Compound should be stirred before using. The useful shelf life is in excess of four months. Refrigeration below 40°F will increase shelf life.

REQUIRED CATALYSTS

RTV-9801 (liquid) and RTV-9891 (paste) are special catalysts required to provide the excellent closed mold-thick section curing characteristics in RTV-340.

Typical Properties

Characteristics	RTV-9801	RTV-9891
Color	clear-light straw	light blue
Consistency	liquid	pourable paste
Viscosity	-	(500 to 850 poises)
Specific Gravity	1.26	1.75

BONDING

RTV-340 will bond to other surfaces by techniques described on page 11 of Technical Data Book S-3C, available upon request. Bond strengths are greater than the rubber itself. Recommended primers are SS4004, SS4044 and SS4101.

ORDERING INSTRUCTIONS

Specify quantity and product and catalyst designation as indicated. Orders should be sent directly to General Electric Company, Silicone Products Department, Waterford, New York or to the Silicone Products Department sales office nearest you.



supplementary data

RTV-116

Red Pourable-Liquid Silicone Rubber

RTV-116 is a precatalyzed red RTV liquid silicone rubber specially designed for extreme high temperature applications. Having a low viscosity (approximately 400 poises) in the uncured state, this material is readily pourable and offers self-leveling characteristics. Ready to use, it cures at room temperature to a firm, flexible, resilient rubber on exposure to moisture from the air. The sealant contains no solvent, cures with negligible shrinkage and adheres to most surfaces without the aid of a primer.

TYPICAL PRODUCT PROPERTIES (Not for use in preparing specifications.)

Uncured Properties

Color	Red
Specific Gravity	1.09
Solids Content	Contains no Solvents
Non-Volatiles, % (24 Hrs/158F)	97
Flow	Self-Leveling
Viscosity, Poises	400
Application Rate, gm/min (Semco Gun with #440 Nozzle 0.125 Orifice)	
Gun Pressure: 20 \pm 2 psi	100
90 \pm 2 psi	600

Curing Characteristics

Curing takes place on exposure to air, forming a skin on the surface, and progressing through the material with time. The material becomes tack-free in approximately 30 minutes and cures through a 1/8-inch section in 24 hours at 77F and 50 percent relative humidity. Lower temperature and humidity will slow the rate of cure. Higher temperatures and humidity will accelerate the cure.

During initial stages of cure a noticeable odor caused by acetic acid is produced. This odor will disappear after complete cure. When using RTV-116 on electrical or electronic parts, a preliminary check is suggested to determine the effects of small amounts of acetic acid on the specific components.

Physical Properties

(ASTM pressed sheets cured at 77F and 50 percent RH.)

2-Day Cure 7-Day Cure

Hardness, Shore A	22	24
Tensile Strength, psi	425	445
Elongation, %	400	350
Tear Strength, Die C, Lb/In	53	51
Linear Shrinkage, %	0.2	0.3
Specific Gravity	1.09	1.09

Effects of Heat Aging

RTV-116 is recommended for extreme high temperature applications. This product is specially designed and processed to perform at temperatures from -85F to +600F with relatively little change in physical properties. (The data given below was obtained on ASTM pressed sheets cured for one week at 77F and 50 percent RH.)

Property	Time at Temperature						
	1 Wk/ 77F	24 Hrs/ 480F	7 Days/ 480F	14 Days/ 480F	24 Hrs/ 600F	7 Days/ 600F	14 Days/ 600F
Hardness, Shore A	24	12	14	16	13	26	38
Tensile Strength, psi	445	365	455	450	385	450	565
Elongation, %	350	500	490	465	450	320	300
Tear, Die C, Lb/In	51	40	42	45	35	38	54
Linear Shrinkage, %	0.3	1.0	2.0	2.3	2.0	4.8	11.3
Weight Loss, %	-	3.8	5.5	6.2	9.7	21.6	32.4

Adhesion

Adhesion is attained on most clean surfaces without the aid of a primer. The adhesive bond improves with time during cure. Within a few days the bond strength becomes greater than the cohesive strength of the rubber.

Typical bond strength data are given below:

Shear Adhesion Data from Alclad Aluminum 2024-T6 at 77F and 50% RH¹

Time of Cure	Psi	% Cohesive Failure	Substrate
72 Hours	150	100	Unprimed Alclad Aluminum
7 Days	190	100	Unprimed Alclad Aluminum
7 Days	225	100	SS-4004 primed Alclad Aluminum

¹ 20-mesh stainless steel screen was bonded to substrate listed. In the case of the primed substrate adhesion samples, both the substrate and screen were primed.

Due to the various types of bond strengths required for different applications and the unlimited number of possible substrates, it is suggested that a preliminary check be made to determine the bonding effects of RTV-116 with specific materials.

For extremely difficult to bond surfaces such as nickel and stainless steel the use of a primer such as SS-4004 or SS-4044 is recommended prior to RTV-116 application.

STORAGE AND SHELF LIFE

RTV-116 is commercially available in three-ounce and 12-ounce collapsible aluminum tubes, six-ounce plastic cartridges and in bulk containers. In the original sealed containers and stored at temperatures below 80F, the useful shelf life of this material will be at least 12 months.

To prevent any curing within the tube, wipe off all excess material around the nozzle after each application and keep TIGHTLY sealed. If a small amount of cured rubber does form around the opening during exposure to air, it can easily be removed and will not affect the remainder of material in the tube.

SPECIFICATIONS

The properties shown have been determined from laboratory tests and are typical of the products. However, a reasonable degree of variation will occur in commercially produced material. The typical values shown here should not be used as a basis for specifications. Please contact

the Silicone Products Department at Waterford, New York for assistance and recommendations in the preparation of a material specification for RTV-116.

Standard test procedures developed for the rubber industry are frequently used in measuring silicone elastomers. The following standard tests have been used in obtaining test data shown here:

Specific Gravity	ASTM D-792
Durometer, Hardness, Shore A	ASTM D-676
Tensile Strength and Elongation	ASTM D-412
Tear Resistance	ASTM D-462

ORDERING INFORMATION

Specify quantity and product designation as indicated. Refer to General Electric RTV-116 Price Schedule for current price and packaging information. Orders should be sent directly to General Electric Company, Silicone Products Department, Waterford, New York, or the nearest G-E silicone sales office, or from your authorized G-E silicone distributor.



supplementary data

RTV-118 ONE PACKAGE - LIQUID RTV SILICONE
RUBBER SEALANT

RTV-118 is a precatalyzed translucent RTV liquid silicone rubber. Having a low viscosity (approximately 350 poises) in the uncured state, this material is readily pourable and offers self-leveling characteristics. Ready to use, it cures at room temperature to a firm, flexible, resilient rubber on exposure to moisture from the air. The sealant contains no solvent, cures with very little shrinkage and adheres to most surfaces without the aid of a primer.

APPLICATIONS

Applications may consist of thin film rubber impregnation by dipping or brushing, potting of detailed electrical terminals and apparatus by pouring, and thin film rubber coatings for mechanical protection that may be applied by brushing or spraying.

TYPICAL PRODUCT PROPERTIES
(Not for use in preparing specifications)

Uncured Properties

Color	Translucent
Specific Gravity	1.06
Solids Content	Contains No Solvents
Non-Volatiles, % (24 Hrs/158 F)	97
Flow	Self-Leveling
Viscosity, Poises	350
Application Rate, gm/min. (Semco Gun with #440 Nozzle 0.125 Orifice)	
Gun Pressure: 20 \pm 2 psi	100
90 \pm 2 psi	600

Curing Characteristics

Curing takes place on exposure to air, forming a skin on the surface, and progressing through the material with time. The material becomes tack-free in approximately 30 minutes and cures through a 1/8-inch section in 24 hours at 77 F and 50 percent relative humidity. Lower temperature and humidity will slow the rate of cure. Higher temperatures and humidity will accelerate the cure. The optimum cure conditions are 90 F and 90 percent RH.

During initial stages of cure a noticeable odor caused by acetic acid is produced. This odor will disappear after complete cure. When using RTV-118 on electrical or electronic parts, a preliminary check is suggested to determine the effects of small amounts of acetic acid on the specific components.

Priming exposed surfaces with an RTV silicone primer

(SS-4004, SS-4044, or SS-4101) reduces the possibility of corrosion resulting from the liberated acetic acid.

Physical Properties

(ASTM pressed sheets cured at 77 F and 50 percent RH.)

	2-Day Cure	7-Day Cure
Hardness, Shore A	25	27
Tensile Strength, psi	500	520
Elongation, %	400	350
Tear Strength, Die B, LB/In.	35	33
Linear Shrinkage, %	0.2	0.3
Specific Gravity	1.06	1.06

Effects of Heat Aging

RTV-118 withstands temperatures from -85 F to +300 F for extended periods and up to +500 F for shorter time periods. (Typical data obtained on ASTM pressed sheets cured one week at 77 F and 50 percent RH.)

Property	Time at Temperature (After One Week Cure)			
	1 Wk/ 77 F	24 Hrs/ 300 F	24 Hrs/ 350 F	24 Hrs/ 400 F
Hardness, Shore A	27	26	25	26
Tensile Strength, psi	520	450	440	400
Elongation, %	350	300	290	280
Tear, Die B, Lb/In.	33	30	30	33
% Weight Loss	---	0.8	2.3	2.7

Electrical Properties

(ASTM pressed sheets cured one week at 77 F and 50 percent RH. Specimens conditioned 24 hours/23 C and 50 percent RH prior to electrical testing.)

Dielectric Strength, Volts/Mil
(approx 65 mil) 1 inch Electrode 542

Dielectric Constant
60 Cps 2.70
10³ Cps 2.65
10⁶ Cps 2.60

Dissipation Factor
60 Cps .0004
10³ Cps .0004
10⁶ Cps .0018

Volume Resistivity, ohm-cm 2 X 10¹⁵

Adhesion

Adhesion is attained on most clean surfaces without the aid of a primer. The adhesive bond improves with time during cure. Within a few days the bond strength becomes greater than the cohesive strength of the rubber.

Typical bond strength data available on limited test samples to date are as follows:

Substrate ¹	Adhesive Characteristics, Properties			
	Shear Strength*		Peel Strength**	
	psi	% Cohesive Failure	Lb/In.	% Cohesive Failure
<u>Unprimed</u>				
Copper	170	100	---	---
Aluminum 2024-T6	170	100	20	100
Glass	(2)	100	---	---
Clear Acrylic	(2)			
<u>Primed - SS-4004</u>				
Aluminum 2024-T6	140	100	20	100
Stainless Steel #304	140	100	---	---
Steel - Cold Roll #SE-1010	140	100	20	100
¹ 20-mesh stainless steel screen bonded to substrate listed. ² Specimen broke in test. *70 hour cure at 77 F and 50% RH. **7 day cure at 77 F and 50% RH				

Due to the various types of bond strengths required for different applications and the unlimited number of possible substrates, it is suggested that a preliminary check be made to determine the bonding effects of RTV-118 with specific materials.

For extremely difficult to bond surfaces such as nickel and stainless steel the use of a primer is recommended prior to RTV-118 application. (SS-4004, SE-4101 or SS-4044.)

STORAGE AND SHELF LIFE

RTV-118 is commercially available in three-ounce and 12-ounce collapsible aluminum tubes, six-ounce plastic cartridges and in bulk containers. In the original-sealed containers and stored at temperatures below 80 F, the useful shelf life of this material will be at least 12 months.

To prevent any curing within the tube, wipe off all excess material around the nozzle after each application and keep TIGHTLY sealed. If a small amount of cured rubber does form around the opening during exposure to air, it can easily be removed and will not affect the remainder of material in the tube.

SPECIFICATIONS

The properties shown have been determined from laboratory tests and are typical of the products. However, a reasonable degree of variation will occur in commercially produced material. The typical values shown here should not be used as a basis for specifications. Please contact the Silicone Products Department at Waterford, New York for assistance and recommendations in the preparation of a material specification for RTV-118.

Standard test procedures developed for the rubber industry are frequently used in measuring silicone elastomers. The following standard tests have been used in obtaining test data shown here:

Specific Gravity	ASTM D-792
Durometer, Hardness, Shore A	ASTM D-676
Tensile Strength and Elongation	ASTM D-412
Tear Resistance	ASTM D-624
Dielectric Constant and Dissipation Factor	ASTM D-150
Dielectric Strength	ASTM D-149
Volume Resistivity	ASTM D-257

ORDERING INFORMATION

Specify quantity and product designation as indicated. Refer to General Electric RTV-118 Price Schedule for current price and packaging information. Orders should be sent directly to General Electric Company, Silicone Products Department, Waterford, New York, or the nearest G-E silicone sales office or from your authorized G-E silicone distributor.